Utilizing TeachLivE™ (TLE) to Build Educational Leadership Capacity: The Development and Application of Virtual Simulations

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Abstract

Simulation and immersive virtual environments area growth areas but there is scarce evidence of this technology being utilized in the field of educational leadership or in school leadership preparation programs. Scenario simulation offers a compelling approach to leadership development, especially because it can be designed to address specific dimensions of leadership. Internally constructed scenario simulations can be used to engage participants' in strategic leadership learning experiences using interactive dialogue and feedback. In this article, the authors describe the development of scenario simulations for use in a specific virtual environment, TeachLivE™ (TLE). The use of customized scenarios has the potential to provide a robust learning experience providing the scenario designer is both a scholar and practitioner in the simulated scenario's domain; is clear on the scenario's purpose; constructs scenarios that engage both the avatar and the aspiring administrator; and generates the opportunities and actions that align with the scenario's purpose.

Keywords: School Administration Preparation, Virtual Environment, Scenario Planning, Simulation

The role of university principal preparation programs is to ensure participants are ready to confront the difficulties of school leadership (Hess & Kelly, 2007) but it is argued that pre-service principals are not equipped with the skills to apply theoretical learning to real-life situations (Oplatka, 2009). A review of the research on the effectiveness of university–based educational leadership programs by Darling-Hammond et al. (2010) identifies authentic field experience as having a high impact on the preparation of educational leaders. Consequentially, internships or clinical experience are integrated in almost every educational leadership program enabling the aspiring principal to "walk the walk," while at the same time receiving feedback from highly effective practitioners. However, controlling experiences that the novice is exposed to can be difficult and occasionally there are massive gaps in the aspiring principal's knowledge and experience preventing them from acquiring and demonstrating their mastery of complex professional skills. This article describes a pedagogical practice utilizing technology, TeachLivE™ (TLE) to enhance leadership capacity. The development of scenario simulations for use in an immersive virtual environment is described. This pedagogical approach specifically addresses the problem of ensuring aspiring principals are exposed to a variety of learning experiences as scenarios are dynamic unlike paper-case-based and/or role-play-scenario-based learning strategies.

1. Pedagogical Practices

1.1 Role Playing

Educational leadership program design needs to ensure that practical experiences are available to scaffold the development of deep knowledge (Bloom, 1956). One pedagogical approach is that of role-playing.

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A learning method based on authentic experience (Riera, Cibanal, &Mora, 2010; Johnson and Johnson, 1997). In role-playing, an individual "learns by doing, by introspecting, by observing, by giving feedback, and by engaging in an overall analysis of the total activity," (Eitington, 1989, p.77). It can lead to changed behaviors and attitudes, new ways of handling situations, and the development of emotional experiences (Johnson and Johnson, 1997). Esslin (1976) observes that dramatic play, as an instructional simulation activity has long been part of the human experience as it encourages participants to view situations or problems from different perspectives giving insight into the views of others. Role-playing is probably the oldest form of simulation used in the academy, dating back to the 1800s (Brown, 1999). Generally, role-plays are useful for practicing and developing interpersonal skills, including conflict management, negotiation, influencing team building, active listening, giving and receiving feedback, and communication (Thiagarajan, 1996). Role-playing can help an individual overcome fear and reduces uncertainty and anxiety (Riera, Cibanal, &Mora, 2010). Research in the field of nursing has shown that professional expertise is enhanced because role-playing allows repetition and the acquisition of reflexes and habits. While aspiring school administrators (Hemphill et al., 1962) found role-playing to be effective in providing a safe learning environment, concrete situations to respond to, and insight into complex professional situations. More recently Sogunro (2004) reported on his experiences of including role-playing in various educational leadership course over a period of five years (1998-2003). He observed more than 500 students from various higher education institutions in both the USA and Canada role-playing and noted that students found the experience "interesting and educating" (p.365). However, while role-playing engages the learner in an active role as they make choices and decisions there are seldom outcomes of consequence to the learner (Shakeshaft, Becker, Mann, Reardon, Robinson, 2013). This criticism is less likely to be leveled against participating in simulations.

1.2 Simulation

A simulation is a person, device, or set of conditions, which attempts to present an authentic problem, which must be responded to as you would under natural circumstances (McGaghie, 1999; Heinich, Molenda, and Russell, 1993; Sparrow, 2000). They allow individuals to have repeated trials involving high stakes situations without risk of loss of valuable resources (e.g. money, time, and people) (Hayes, Straub, Dieker, Hughes, &Hynes, 2013). The capacity for a simulation to be an effective learning approach is based largely on the ability of the simulation to represent the targeted scenarios in a manner that allows the transference of learning to real time practice (Lapkin & Levett-Jones, 2011; Laschinger et al., 2008). Participants take on a prescribed role and interact with other participants or elements of the simulated environment. They allow themselves to accept a false situation as temporarily real (Brown, 1999). The idea of teaching through the use of simulation is not a new one (Cruickshank &Telfer, 1980; Brown, 1999) and has in the past been an embracing term for paper-and-pencil style games, role-playing games, card games, and other pedagogical experiences (Cruickshank, 1977). An early example of a simulation exercise developed in the 1950s and used in training and management development is the in-tray or in-basket exercise (Gill, 1979). The in-tray is a simulation representing the typical contents of an executive's in-tray with a variety of everyday problems both expected and unexpected, requiring decisions and action. This type of early simulation exercise was used as an assessment rather than a learning tool and is a reflection of the ongoing transition from role-playing to simulation. The military have utilized simulations as both an assessment and learning tool for over 200 years in order to train pilots and prepare soldiers for battle field strategy (Staub & Bravender, 2014; Shakeshaft et al., 2013)). While the simulation environment may not precisely resemble real life given the nuances of human interactions, the novice pilot or soldier has the benefit of trial and error when making decisions. Similarly, recent research in the education field conducted by Staub and Bravender (2014) also focused on decision-making. They found that graduate students in an principal preparation program who developed their own decision making scenarios in Sim Writer Simplcity (an online tool) developed increased leadership skills in comparison to the control group whose decision making was based on pre-existing scenarios.

Four influential meta-analyses of the research on the use of simulations specifically in the medical field have occurred in the last two decades (Shakeshaft et al., 2013). First in 1999, Issenberg et al. concluded simulations could be successful if integrated throughout the entire curriculum allowing learners to receive professional feedback and the opportunity to act on the feedback received. Second, in 2005, Issenberg, McGaghie, Petrusa, Gordon, and Scalese reviewed literature from 1969-2003 and concluded that high fidelity medical simulations facilitated learning under the right conditions. Third, in 2006, McGaghie, Issenberg, Petrusa, and Scalese further synthesized a subset of 31 journal articles from the 2005 review. Their conclusions reinforced previous meta-analyses outcomes that medical simulations are associated with improved learner outcomes.

The most recent meta-analyses occurred in 2010 when McGaghie, Issenberg, Petrusa, and Scalese reviewed the research between 2003-2009 and found that there is evidence that medical simulations can provide both situations for mastery of learning and opportunities to allow transfer of practice.

1.3 Simulation Development

According to Mann and Shakeshaft (2013) for simulated environments to be efficient and effective, they must (1) require first-person involvement that forces participation, and that learn-by-doing increases understanding and facilitates behavior change; (2) be learner-specific and context-specific; and (3) couple consequences to decisions and make learning authentic and practical. We would add a fourth important feature, which is that of providing a sense of "real presence, "meaning" the degree to which a person is perceived as a 'real person' in mediated communication" (Gunawardena, 1995, p.151). This phenomenon of "presence" is the key to an effective scenario simulator (Dede, 2009). When a high level of engagement occurs between human and technology, the user believes that he or she is in that environment physically and cognitively. These environments must provide a personalized experience that each aspiring administrator believes is real i.e., the aspiring administrator "suspends his/her disbelief" (Dieker, Rodriguez, Lignugaris/Kraft, Hynes, & Hughes, 2014a). At the same time, the administrators must feel a sense of personal responsibility for improving his or her practice grounded in a process of critical self-reflection. These personalized learning environments are needed for aspiring administrators to experience self-directed professional development where mentors, coaches, and aspiring administrators work collaboratively in a safe technology-driven environment (Diekeret al., 2014a). Similar simulations have been integrated in other fields and have benefited participants in training. The titles of programs may differ, however the concept of simulation remains the same. For instance, ARC (Action Review Cycle) in the military, medical, and business simulation world is a simulation process that is now being replicated in the field of teacher preparation (Dieker et al., 2014a).

2. Conceptual Framework

Three frameworks were used to describe the association between scenario simulation planning and the development of aspiring principal's communication and conflict management skills within a diverse school community. The first framework, describes immersive mixed-reality environments with specific reference to TLETeachLivE™. The second framework, immersive simulation and pedagogy is focused on experiential learning theory,and in learning based in a scenario simulation. The third framework, describes the theory of scenario simulation planning, illustrates process, and anticipated outcomes of scenario planning. Each framework, and how it was used to create the scenario simulations, are discussed below.

2.1 Immersive Mixed-reality Environments: TLE TeachLivE™

Immersive virtual environments (VEs) combine real and virtual worlds, providing users with a sense of "presence" or immersion, which enables them to perceive the VE as an authentic environment in which action can be taken, comparable to the real world (Dieker, Straub, Hughes, Hynes, &Hardin, 2014b). These VEs provide unique learning opportunities, which unlike the real world, engage users in high-stakes activities without experiencing long term consequences of their actions, allowing them to safely practice and learn from mistakes. An example of a mixed-reality VE is TLE TeachLivE™, developed at the University of Central Florida (UCF) and currently being implemented across 40 university campuses in the United States, as well as in the United Arab Emirates with teacher education programs (Dieker et al., 2014b). Starting in 2005, UCF, College of Education and Human Performance (UCF CEDHP) and College of Engineering and Computer Science (UCF CECS) began a partnership to investigate the use of blending human and avatar interactions to impact teacher practice (Dieker et al., 2014b). The current system that allows one human in the loop to control one or multiple virtual students has impacted more than 10,000 teachers to date. The research in TLETeachLivE™ integrates fundamentals from human-computer interaction, designed to reduce cognitive and physical loads for the puppeteer (called 'Interactor') and increase the sense of presence for the user (called 'Spectactors')(Hayes, Straub, Dieker, Hughes, & Hynes, 2013). A trained interactive performer controls the actions of the avatar (parent) using a combination of head motion capture and provides the voice for the avatar (parent) through a scenario driven improvisational experience (Hayes et al., 2013). In 2013 a new avatar was developed that was an adult that could be used as a parent or a teacher.

The interactor currently can control the system to individualize the challenges and successes for each aspiring school administrator to engage with the adult avatar. This means that the avatar can portray the parent responses to the aspiring administrator on a level between one and five: one being compliant to five being extremely aggressive, abusive and angry. The interface for TLE TeachLivE™ has been designed to be non-intrusive and intuitive ensuring that the environment is both realistic and engaging for the user (Dieker et al., 2014b). Aspiring school administrators in the educational leadership program at UCF currently engage with the parent avatar in an environment where everything looks like a typical administrator's office. However, unlike the brick and mortar setting, the office is a virtual setting and the parent engaging in the conversation is an avatar. The parent or avatar with which the aspiring school administrators are interacting interfaces in a realistic way by acting, talking, and responding like a real parent may behave in a typical parent-administrator conference. Typically, the current paradigm for aspiring school administrators to learn parent interactions, outside of the TLE TeachLivE™ virtual environment, is by shadowing a colleague, intern in their school, or role playing in a college course. The reality being that in all these alternatives paradigms coaching and feedback can be restricted. Simulated scenarios however allow aspiring school administrators to practice, receive coaching and feedback, practice again and then transfer the learning experience to an actual real-life parent administrator conference. In an environment like TLE TeachLivE™, aspiring school administrators can learn, practice, and refine the communication and personal skills needed to become effective school leaders. The outcome in a simulator is that in compressed time (typically ten minute in a simulator is equal to one hour of real time experience) administrators can perfect their craft of meeting with an array of parents instead of waiting until their first year of experience learning with "real" parents.

2.2 Immersive Simulation and Pedagogy

Kolb (1984) conceptualized that learning from experience requires four different kinds of abilities. First, an openness and willingness to become involved in new experiences (concrete experience). Second, observational and reflective skills are needed so that these new experiences can be viewed from a variety of perspectives (reflective observation). Third, analytical abilities are required so integrative ideas and concepts can be created from their observations (abstract conceptualization). Finally, learners need decision-making and problem solving-solving skills so these new ideas can be used in actual practice (active experimentation).The learning process in scenario simulation can be visualized in the same way as Kolb's proposition as a cycle through which learners progress. First, simulation provides the concrete experience for the learner-actually practicing the necessary skills required to be a school leader or administrator. A concrete experience involves not only intellect and thinking but also the use of the senses, and in a way, the whole person. Concrete experience also provides an opportunity for students to learn in a different way rather than simply reading, thinking, or listening. Second, in the reflective observation stage, through their experience, learners can reflect, and see the situation in the simulation for multiple perspectives. Too many times traditional courses are taught in ways that simply impart information that should be retained. Kolb's model emphasizes the importance of giving learners the opportunity to think about what they have done and make meaning. The learner should ultimately be able to apply this meaning to other situations. For example, if school administrator implements a new policy about student behavior and it yields the successful results, then s/he would reflect on what other possible situations that type of solution might be successful.

The third position, abstract conceptualization, in the cycle is to create new ideas and concepts from the concrete experience and the observation, such as creating one's own newly conceptualized solution to an existing problem or situation. After a period of processing, what was once raw "data" can now become an internal model that the learner uses over and over in various scenarios. And finally, active experimentation involves simply "getting in there and doing it". The last stage is crucial for leaders and administrators because once they have actively experimented with a new concept, solution, or idea, they can claim success for it, or if the new concept, solution or idea is not successful, then the process can restart, thus revisiting the cycle. Various scenarios and simulations can be used to increase educational leadership skills. The theory of experiential learning can be used as a model to improve learners' skills as long as they are given an opportunity to progress through all four stages of the cycle. So in summary of Kolb's model, the cycle begins with an experience that the student has had, followed by an opportunity to reflect on that experience. Then students may conceptualize and draw conclusions about what they experienced and observed, leading to future actions in which the students experiment with different behaviors. This begins the cycle anew as students have new experiences based on their experimentation (Oxendine, Robinson, & Willson, 2004).

2.3 Theory of Scenario Simulation Planning and Design

The word "scenario" is derived from the Latin *scaena*, meaning scene (Ringland, 1998). Scenarios try to understand how critical uncertainties might interact in ways not previously considered (Wack, 1985). A frequently used definition crafted by Van Notten (2006) defines scenarios as consistent and coherent descriptions of alternative hypothetical futures that reflect different perspectives on past, present, and future developments, which can serve as a basis for action. Scenarios involve a temporal sequencing of events that can be organized chronologically or thematically, but they are related by time and they have a mutually reinforcing logic that makes them plausible (McGaghie, 1999; Van Notten 2006).There are many types of scenario approaches in use ranging from the highly exploratory to the decision-oriented, and intuitive to analytical (Sparrow, 2000). Common to all approaches is that the created scenario allows for alternative hypothetical futures or outcome that reflects different perspectives and can serve as a basis for action (Van Notten 2006). Recently, the scenario method has been considered a powerful tool for the awareness raising, dialogue, reflection, and collaborative learning of professionals, like teachers and teacher educators (OECD, 2007). Scenario simulation development emerged following World War II in US military strategic planning with the RAND Corporation. In the 1960s, General Electric and Royal Dutch Shell introduced scenario techniques in their corporate planning procedures and in the 1970s scenarios achieved prominence in speculations about the future of society, the economy and the environment. A 1962 survey of business schools reported that scenario simulations were in use at more than 70 of the U.S. schools (Dale & Klasson, 1962), a pattern that was mirrored internationally. Today, scenario simulations are used in a wide range of contexts in order to gain foresight on options for future behavior and action.

2.3.1 Scenario Simulation Planning

Chermack (2004, 2003b) identified five scenario planning performance drivers: (a) scenarios (Schwartz, 1991),(b) learning (Wack, 1985), (c) mental models (Senge, 1990), (d) decisions (Chermack, 2003a), and (e) ability to reach desired outcome. The first four units are components of the scenario planning process and improved performance is the desired outcome. The particular usefulness of this theoretical framework is that it makes both process and outcome characteristics and components of scenario planning explicit and thus comparable with leadership standards aligned with the course. Van Notten (2006) proposes a scenario planning typology consisting of three broad categories. Each category is interconnected and include the following: (a) the "why" to help define the goals of the scenario; (b) the "how" to help define the design of the scenario process; and (c) the "what" to help define the complexity of the scenario content. The goal is to define the elements required to make the scenario authentic and to identify their causal and logical relations. As a starting point for developing scenarios, key factors are identified that shape and give meaning to the issue. Van Notten's key factors are known as driving forces as opposed to Chermack's driving levers.

2.3.2 Scenario Simulation Design

In designing a scenario simulation core questions to initially address are a) what are the benefits of participating in the scenario simulation? b) what are the key elements required to structure the process? and c) what is the time allocation? Once these questions have been answered then the scenario simulation designer can move onto the next stage of focusing on the specific skills that the aspiring administrator is seeking to practice. In the examples discussed in this paper the scenario simulations were designed to develop interpersonal skills, communication skills, conflict management skills, and knowledge of Florida rules, regulations, and legislation that guide the everyday behavior and decision making of school administrators. For each developed scenario simulation the following questions were considered: Why is scenario simulation appropriate for developing interpersonal skills, communication skills, conflict management skills, and knowledge of Florida rules, regulations, and legislation? How will this scenario simulation develop interpersonal skills, communication skills, conflict management skills, and knowledge of Florida rules, regulations, and legislation? Has the scenario simulation designer the required knowledge and experience to design a scenario simulation, which will enable the aspiring school administrator the opportunity to practice the required skills? How should the scenario simulation be resolved? Is there a preconceived outcome? These questions build upon the steps articulated by Van der Heijden (1996) and Van Notten (2006) as essential to the scenario design process.

These steps are(a) identification of problem;(b) description of relevant factors i.e. drivers; (c) prioritization and selection of relevant factors i.e. drivers; and (d) the creation of scenarios. Careful planning and thinking in the early stages significantly improve the quality of any crafted scenario.

TeachLivE™ Administrator/Parent Conference

Handling parental complaints is typically the responsibility of the principal especially in primary schools (Goldring, 1990). Figure 1 displays the TeachLivE™(TLE) cycle.
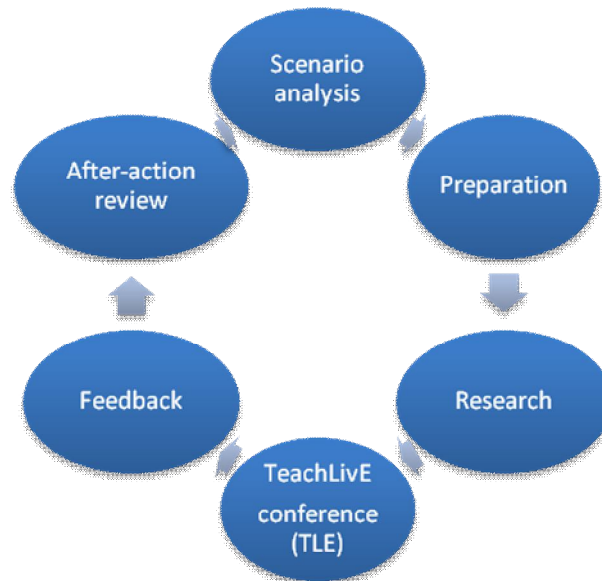
Each stage in the cycle facilitates and scaffolds the final outcome. For example, the preparation stage and the research stage both encourage the aspiring principal to consider multiple perspectives and to build critical thinking and justification skills, whilst the TeachLivE™ Conference (TLE) encourages application of their preparation and research. Several K-12 scenarios are presented to the aspiring principal for review and analysis. The specific school tier is not identified although conclusions can be drawn based on the context. The scenario includes pertinent clues about the school culture and home school relationships, which is part of the course being taught (Community School Administration).In preparation for the TLE conference research into federal, state, and school district legislation, policy and guidelines relevant to the scenario is required. Once this step is completed the aspiring administrator is ready to conduct an administrator/parent conference in the TLE Lab. Time allocated to the scenario simulation interaction and feedback should be transparent and structured. In the example below ten minutes was allocated for the interaction with the parent (avatar), five minutes for coaching, and fifteen minutes for reflection. However, the instructor can control these variables. The common goals for the two scenarios outlined below are:

1. To listen and communicate effectively with the parent fostering a relationship of trust.
2. To engage the parent and focus on the student, seeking information from the parent as the expert on the student's strengths and needs.
3. To engage the parent in developing a strategy that can be managed by the school, and agreed to and supported by the parent.
4. To be prepared to respond to any one of a possible future outcome.

Scenario

Sean is an excellent student, but recently there has been a marked change in his behavior, which several teachers have commented on. For the first time ever, Sean was given a detention due to his rude behavior and attitude in his mathematics class. What was particularly worrying is that Sean did not seem concerned about his behavior. His teacher called home to communicate her concerns to Sean's mother and was astounded by the response that she received. Sean's mother was abusive on the phone blaming the school for Sean's deteriorating behavior and attitude. In particular, Sean's mother focused on the teacher, who she said had humiliated Sean in class and seemed to hate her son. Sean no longer wanted to go to school in the mornings and this was causing a great deal of stress at home.

Sean's mother, Jeanette McGowan, has agreed to come in for a conference with you, the administrator. The challenges of this scenario are particularly complex as a parent is complaining about a teacher. The school administrator may also have different priorities relating to Sean's behavior and academic achievement. As a consequence the school administrator has to navigate between appropriate respect for their staff and responsiveness to the complaining parent. There has already been one attempt at communicating with the parent by Sean's teacher, which did not result in the outcome anticipated by the teacher. According to the teacher, the parent's perception is that the school has caused the recent problems and not her son. The avatar (Mrs. McGowan) can interact with the aspiring school administrator on a difficulty level from 1-3. In this case it relates to how amenable, confrontational, and aggressive the parent is going to be. In interacting with Mrs. McGowan the school administrator needs to ensure that an action plan is developed in partnership with the parent that addresses Sean's attendance issues, his behavior and his academic achievement.

3. Recommendations

The scenario simulation model as described in this paper has the potential to be a strategic and valuable tool for school leadership development whether for aspiring school leaders or for experienced school leaders wishing to develop new skills. But as with so many things, the potential of immersive virtual environments are only as good as the scenarios they utilize. Therefore, scenario creators need to be both excellent scholars and practitioners; possess the required skills and knowledge to facilitate construction of scenarios; clear on purpose; construct scenario simulations that engage both the avatar and the aspiring school administrator; and generate the opportunities and actions that align with the scenario's purpose. The avatar can be requested to interact with the aspiring school leader on a 1-3 level. One being a compliant parent to three being extremely intimidating and threatening. It is recommended that the aspiring school leader has the opportunity to interact with the avatar on several different levels in order to 1) develop the required communication and interpersonal skills, 2) gain greater understanding of conversation dynamics, 3) gain an understanding that though a student incident may at times seem familiar the dynamics of a conversation with a parent is individualized and contextual, and 4) understand that no two conversations are the same. Having constructed customized scenarios appropriate for an immersive simulated environment the next challenge is to extend the inquiry to include additional field-based and empirical data, which will enable testing the association of scenario planning, coaching, and feedback with the development and refinement of aspiring school administrator's communication and leadership skills.

4. Conclusion

Scenario simulations are an enhanced version of case-based and scenario-based pedagogical methods, and TeachLivE™ (TLE) is advancement in principal preparation pedagogy. An immersive virtual environment provides a holistic practice environment for the aspiring principal by presenting an interactive experience blending compelling stories and characters with robust, authentic learning. The fact that different avatars respond differently to scenarios characterizes the authenticity of the experience for the aspiring principal. Transitioning from the traditional scenario involving face-to-face interaction to an immersive virtual environment is an exciting opportunity as new, and innovative technology tools are applied to educational leadership preparation programs. Future success of this pedagogical method will be dependent on technical competence as well as the professional knowledge, and practitioner experience of the scenario simulation designer.

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